Report Date: 24 Apr 2015

Summary Report for Individual Task
052-12T-1608
Determine the Moisture Content of a Soil Using the Calcium Carbide Gas Pressure Method
Status: Approved

Condition: Given a calcium carbide (speedy) test set, pencil, industrial spectacles, and Technical Manual (TM) 3-34.43. This task should not be trained in MOPP 4.

Standard: Determine the moisture content of a soil sample to within +/- 0.5 percent using the calcium carbide gas pressure method.

Special Condition: None

Safety Risk: Low

MOPP 4: Never

Task Statements

Cue: None

DANGER

The chemical reaction of calcium carbide with water produces acetylene gas, which is extremely flammable. Exercise extreme caution to avoid open flame when releasing the gas from the calcium carbide pressure (speedy) moisture tester. Perform the test in a well-ventilated area, as asphyxiation could occur if performed in a confined area.

WARNING

None

CAUTION

None

Remarks: None

Notes: This tester should not be used on soils that contain material greater than No. 4 sieve (4.75-millimeter diameter). Further, high plasticity clays or other soils not friable enough to break up may not produce representative moisture contents because the reagent cannot mix well with the soil sample.

Performance Steps

1. Inspect the pressure vessel to ensure it is free of debris and residue from previous testing iterations. Use the supplied cleaning brush and cloth to clean the pressure vessel, if necessary.

2. Weigh 26 grams of soil to be tested. Place the 26 grams of soil inside the pressure vessel.

3. Hold the pressure vessel in a horizontal position and insert the two 1 1/4-inch steel balls.

Note: Dropping the steel balls while the vessel is in a vertical position will damage/destroy the gauge mechanism within the pressure vessel.

4. Place three scoops (24 grams) of calcium carbide in the cap of the moisture tester.

5. Hold the pressure vessel in the horizontal position and attach the cap to the pressure vessel. Tighten the clamp over the cap to seal moisture tester.

Note: Hold the pressure vessel in a horizontal position to ensure that no calcium carbide comes in contact with the soil until a complete seal is achieved.

6. Rotate the moisture tester to a vertical position so that the calcium carbide in the cap will fall into the pressure vessel.

7. Rotate the moisture tester back to the horizontal position and agitate the mixture by swirling the moisture tester in a forceful rotating motion. Agitate for a minimum of 1 minute for granular soils and/or 3 minutes for other soil types. Allow time for the dissipation of the heat generated by the chemical reaction.

Note: Do not shake the moisture tester in a motion that the steel balls will damage the instrument or cause soil particles to become embedded in the orifice leading to the pressure diaphragm.

8. Hold the moisture tester in a horizontal position at eye-level and read the dial once the needle stops moving. Record the dial reading as the percent of moisture by wet mass to the nearest 0.5 percent.

9. Point the cap of the moisture tester in a safe direction, away from the operator, and release the gas pressure slowly.

10. Empty the pressure vessel and examine the material for lumps. If the sample is not completely pulverized, thoroughly clean the pressure vessel and cap, and repeat the test using a new sample.

Note: The limit of the tester is 12 percent moisture for aggregate or 20 percent moisture for soil. If these limits are exceeded, then the test must be ran again using a half-sized sample (13 grams) and the dial reading must be multiplied by 2.

11. Clean and store the moisture tester upon completion of testing.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: Score the Soldier GO if all steps are passed (P). Score the Soldier NO-GO if any step is failed (F). If the Soldier fails any step, show them how to do it correctly.

Evaluation Preparation: Setup: Provide the Soldier with the items listed in the condition statement. Ensure that all safety precautions are followed. Prepare the testing site and equipment in advance to ensure that the task standard can be met.

Briefing: Give the Soldier a safety briefing and read the task, condition, and standard before starting the task.

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Inspected the pressure vessel to ensure it was free of debris and residue from previous testing iterations. Cleaned as needed.			
2. Weighed 26 grams of soil to be tested and placed in the pressure vessel.			
3. Placed the two 1 1/4-inch steel balls into the pressure vessel.			
4. Placed three scoops (24 grams) of calcium carbide in the cap of the moisture tester.			
5. Held the pressure vessel in a horizontal position and attached the cap. Tightened the clamp over the cap and sealed the moisture tester.			
6. Rotated the moisture tester to a vertical position so that the calcium carbide in the cap fell into the pressure vessel.			
7. Rotated the moisture tester back to the horizontal position and agitate the mixture by swirling.			
8. Read and recorded the dial as the percent of moisture by wet mass to the nearest 0.5 percent.			
9. Pointed the cap of the moisture tester in a safe direction, away from the operator, and released the gas pressure slowly.			
10. Emptied the pressure vessel and examined the material for lumps.			
11. Cleaned and stored the moisture tester once testing was complete.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	ASTM D2216-10	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock Mass.	Yes	No
	TM 3-34.43	Materials Testing	Yes	Yes

Environment: Environmental protection is not just the law but the right thing to do. It is a continual process and starts with deliberate planning. Always be alert to ways to protect our environment during training and missions. In doing so, you will contribute to the sustainment of our training resources while protecting people and the environment from harmful effects. Refer to FM 3-34.5 Environmental Considerations and GTA 05-08-002 ENVIRONMENTAL-RELATED RISK ASSESSMENT. Conduct an Environmental Risk Assessment IAW FM 3-100.4. The assessment should be recorded on the Risk Management Worksheet found in Appendix F of FM 3-100.4. During the assessment, be on the lookout for environmental hazards, Environmental hazards include all activities that may pollute, create negative noise-related effect, degrade archaeological, cultural resources, negatively affect threatened or endangered species' habitats.

Safety: In a training environment, leaders must perform a risk assessment in accordance with ATP 5-19, Risk Management. Leaders will complete the current Deliberate Risk Assessment Worksheet in accordance with the TRADOC Safety Officer during the planning and completion of each task and sub-task by assessing mission, enemy, terrain and weather, troops and support available-time available and civil considerations, (METT-TC). Note: During MOPP training, leaders must ensure personnel are monitored for potential heat injury. Local policies and procedures must be followed during times of increased heat category in order to avoid heat related injury. Consider the MOPP work/rest cycles and water replacement guidelines IAW FM 3-11.4, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, FM 3-11.5, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination. All operations will be performed to protect and preserve Army personnel and property against accidental loss. Procedures will provide for public safety incidental to Army operations and activities and safe and healthful work places, procedures, and equipment.

Prerequisite Individual Tasks : None

Supporting Individual Tasks : None

Supported Individual Tasks : None

Supported Collective Tasks : None